REMARKS

This is in response to the Office Action dated December 3, 2004, on which the shortened period for response expires on March 3, 2004. Applicants petition for a one-month extension, extending the period for response to April 3, 2004. Accordingly, this response is timely filed.

Applicants' Claims 1-8 are currently pending in the above-identified patent application. Claims 1-2 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claim 1 of U.S. Patent 6,129,528 (hereinafter "Bradbury"). Claims 1, 3-4, 7 and 8 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 4,834,617 (hereinafter "Wainauski"). Claims 2, 5 and 6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wainauski.

I. Double Patenting Rejection

The examiner has rejected Claims 1 and 2 under the judicially created doctrine of obviousness-type double patenting. The Examiner asserts that Claims 1 and 2 are unpatentable over Claim 1 of Bradbury.

Should the Examiner determine that the claims as amended are distinguishable over Wainauski, Applicants will submit a terminal disclaimer in compliance with 37 C.F.R. 1.321(c) to overcome the obviousness-type double patenting rejection.

II. Rejection under 35 U.S.C. § 102(b) of Claims 1, 3-4, 7 and 8

The Examiner has rejected Claims 1, 3-4, 7 and 8 under 35 U.S.C. § 102(b). The Examiner asserts that Wainauski teaches the elements of Applicants' claimed invention. Applicants have amended Claims 1, 3-4, 7 and 8 to explicitly recite that the blade for an impeller of an axial fan also comprises a "stagger angle that increases from said root portion to said tip portion."

As provided in paragraph [0011] of Applicants' patent application, "it is desirable to locate the maximum work distribution at some favorable location between the root portion and the tip portion." While it is important to minimize the work at the root portion of the blade to allow the axial flow fan to have a smaller axial width, locating the maximum work distribution at the tip can result in an intolerable increase in the noise signature of the fan. That is why, as provided in paragraph [0021] of Applicants' claimed invention, an object of the invention is to design an axial fan blade which allows for a reduction in axial width while locating the maximum work distribution between the root portion and the tip portion of the blade.

In paragraph [0008] of Applicants' claimed invention, the stagger angle is one of a plurality of factors that affects the performance characteristics of an axial fan blade. Locating the maximum work distribution between the root portion and the tip portion of the blade is accomplished by defining the stagger angle in relation to the camber angle. Wainauski does not disclose a stagger angle, let alone a stagger angle that increases from the root portion to the tip portion of the blade. Thus, Applicants respectfully submit that amending Claims 1, 3-4, 7 and 8 to include the limitation of a "stagger angle that increases from said root portion to said tip portion" overcomes the rejection based under 35 U.S.C. § 102(b).

III. Rejection under 35 U.S.C. § 103(a) of Claims 2, 5 and 6

The Examiner has rejected Claims 2, 5 and 6 under 35 U.S.C. § 103(a) as being unpatentable over Wainauski. It is respectfully submitted that this rejection should be withdrawn in view of the following remarks.

A. Claim 2

In rejecting independent Claim 2 under 35 U.S.C. 103(a), the Examiner asserts that Wainuski

teaches a maximum blade thickness of approximately 36% chord and a maximum blade camber at approximately 74% chord. The Examiner further asserts that it would have been an obvious matter of design choice to change the chord positions to between 16%-23% for the maximum thickness and between 40%-51% for the maximum camber. Applicants respectfully disagree with the Examiner's assertions.

The fan blades disclosed in Applicants' claimed invention blow air over electronic components, whereas the propeller blades in Wainauski are designed to propel an airplane. Logically, the design parameters and considerations for the two types of blades are dissimilar. One of ordinary skill in the art of designing compact fans for cooling electronic components would not look to airplane propeller literature for a design to adapt for cooling use.

As stated in paragraph [0060] of Applicants' claimed invention, the most important parameters and constraints of the design of the present invention are "the volumetric flow rate and axial width fan size." The design parameters of the propeller blade disclosed in Wainauski are "high loading and high efficiency at relatively high Mach numbers." When designing an airfoil that has high loading and high efficiency, a person skilled in the art of airplane propellers is concerned with developing the maximum amount of thrust based on the amount of engine horsepower available.

The thrust produced by an airplane propeller depends heavily on the diameter of the propeller and the environment in which it operates. Thrust increases as the diameter of the propeller increases. Thus, airplane propeller designers focus on designing the largest diameter propeller possible. However, designers of electronic cooling equipment attempt to design cooling components with the smallest possible diameter blades. For compact axial fans, as provided in paragraph [0007] of Applicants' claimed invention, "it is desirable to reduce its size while maintaining its performance parameters and design constraints." Therefore, it simply follows that a person designing compact

axial fan blades would not look to large propeller blade designs for guidance on small blade design parameters.

Moreover, propellers and compact axial fans operate in different environments. The density of the fluid in which the propeller operates can greatly affect its performance characteristics. Propellers are designed to work both at ground level and at high elevations. As elevation increases, the density of air decreases. Therefore, a propeller is designed to work efficiently in both high-density air at ground level and low-density air at high elevations. Compact axial fans for cooling electronic components only operate in one environment, and thus a person skilled in the art of compact axial fans operating at ground level would not look to propellers designed to work at both ground level and high altitudes.

In light of the aforementioned, it is respectfully submitted that the limitations provided in independent Claim 2 of Applicants' claimed invention is not an obvious matter of design.

B. Claims 5 and 6

Claims 5 and 6 depend from, respectively, independent Claims 3 and 4, and therefore include all the limitations of Claims 3 and 4. Furthermore, the Examiner has not met his initial burden of proving a prima facie case of obviousness because, as discussed above in relation to independent Claim 2, one of ordinary skill in the art would not consider it a design choice to modify the design of the Wainauski propeller into a fan blade. Accordingly, claims 5 and 6 are also patentable over Wainauski.

IV. Conclusion

For at least the reasons set forth above, Applicants respectfully submit that this patent application, as amended, is in condition for allowance. The Examiner is urged to telephone Applicants' undersigned counsel at the number provided below if it will advance the prosecution of this application. Reconsideration and prompt allowance of this patent application are respectfully requested.

Respectfully submitted,

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